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Measuring the Conductor Spacing in Flat Conductor Cables

One of the principal difficulties in manufacturing flat conductor cable has been the lack of a method to ensure quickly and accurately that the spacing of the leads is uniform. The standard inspection method involves moving the cable across the objective of a toolmaker's microscope with a calibrated spindle. Data on the position of each individual lead must be collected, tabulated, and plotted before it can be ascertained whether or not the lead spacings are within tolerance.

This time-consuming, tedious process can now be eliminated. A newly developed interference method produces a moiré pattern, the shape of which is correlated with the lead spacing. In addition to the advantages of speed, accuracy, convenience, and simplicity of operation, this technique permits continuous rather than spot checking of the spacing. The only requirement is that the material between the leads on the test cable be translucent. Shielded cables must therefore be tested before the shields are added.

Moiré patterns are produced by interference between two periodic geometric designs. In this application, one design is formed by the flat conductors in the cable to be measured; the other is a precision-fabricated master design of uniformly spaced rectangular bars. When the two designs are superimposed, a moiré pattern appears, with a dark band in each region where the bars of one design lie over the spaces of the other, and light zones where the bars of the two designs coincide. Given the situation that the two designs are superimposed at a precisely known, small angle, the following typical patterns may be observed: (1) if the master and the test designs are uniform and

identically spaced, the moiré pattern will consist of equally spaced, linear bands approximately perpendicular to the bars; (2) if the master and the test designs are uniform, but different in spacing, the pattern will consist of equally spaced, linear bands inclined with respect to the bars at an angle which is a known function of the difference in spacing; and (3) if there is any nonuniformity of spacing in the test design, the moiré pattern will consist of wavy, angular, or ragged-edged dark bands, the slope of which at any point determines the spacing of the nearby conductors.

In the referenced report, the various moiré patterns are explained and the method of calculating the inter-conductor spacing from the moiré slant angle is given.

Note:

The following documentation may be obtained from:

Clearinghouse for Federal Scientific
and Technical Information
Springfield, Virginia 22151
Single document price \$3.00
(or microfiche \$0.65)

Reference:

NASA-TM-X-53843 (N69-35124), Measuring the Conductor Spacing in Flat Conductor Cables

Patent status:

No patent action is contemplated by NASA.

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